# NASA Micro-g NExT

*Orion Crew Safety -*
*Surface Autonomous Vehicle for Emergency Rescue*
*(SAVER)*

## Background

NASA has been challenged to go forward to the Moon by 2024 with our Artemis Program, using Orion as the spacecraft. In the event of an unplanned egress (launch abort, contingency landing, etc.), Orion crewmembers will be exiting the crew vehicle and using a life raft. Each astronaut will be equipped with a 406 MHz emergency distress beacon to ensure they can be located should they individually be separated from the life raft and Orion capsule. The SAVER vehicle will assist with long-range Search and Rescue efforts by acting as a force-multiplier, assisting current efforts to tend to survivors on the scene immediately. The current ability to drop a lifeboat from rescue assets allows on-scene rescuers to immediately tend to survivors in the main life raft while SAVER autonomously searches for any isolated victims.

## Objective

Design a surface vehicle capable of assisting astronauts in distress in a maritime environment, through the location and delivery of crew survival aids.

## Assumptions

- For testing purposes, the vehicle will be powered by an umbilical in the NBL.
- To address requirement #4, the team may use commercially available 121.5 MHz homing equipment, or develop a unique solution for use with the NASA-provided beacon.

## Requirements

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| 1 | The vehicle shall be capable of being dropped from a 10-15 foot height into the maritime environment. |
| 2 | The vehicle shall be capable of being carried on a Group 1 (small) or Group 2 (medium), Close-range UAV. |
| 3 | The vehicle shall be capable of transporting (carrying or towing), at a minimum, the following items to the victim:<br>a. Water (1 liter minimum - 2.5 Liters max per Human Systems Integration Standard)<br>b. Medical kit (Orion 0.6 lb kit)<br>c. Spare Life Preserver Unit (LPU)*<br>d. Contingency/Spare 406 MHz Second-Generation Beacon (ANGEL)<br>e. Survival Radio<br><br>Optionally, the following may also be included:<br>f. Inflatable life raft (taking into account size/mass considerations)<br><br>*Note: A pair of Orion LPU lobes with an existing, integrated ANGEL beacon may be used in lieu of other options for requirement c. |
| 4 | The vehicle shall be capable of using existing equipment to detect the ANGEL beacon 121.5 MHz homing signal in order to guide the vehicle toward the beacon. |
| 5 | The vehicle shall be capable of traveling to the person in distress via the most direct route in an autonomous manner, including: |

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| | a. Unmanned operation (no local or remote human intervention)<br>b. Self-guided operations to move to the GNSS position<br>c. Programmed with mission profiles to address specifics of rescue scenario |
| 6 | The vehicle shall include protections in software/hardware to ensure no harm to the crew upon arrival in their vicinity. |